REMARKS

I. Status of the Claims

Claims 1, 3, 6, 9, 10, 12, and 13 are amended.

Claims 16-37 are withdrawn.

Claim 2 is canceled.

Claims 1, 3-15 are pending.

II. Claims 1-15 are Amended

Claims 1-15 are amended to satisfy 35 USC 112, second paragraph requirement.

III. Nakashima (U.S. Patent No. 4,352,884) Does Not Anticipate Claims 1 and 5.

Nakashima et al. do not teach using the type of macroporous polymer substrate of claims 1 and 5 to make microarrays. The '594 patent produces different coatings for carriers to immobilize biomolecules (Abstract and Summary). Absorbent products, e.g., columns are related. In contrast, the present patent relates a method for producing microarrays utilizing macroporous substrate(s).

Nakashima was not found to teach the elements of Claim 2, therefore claims 1 and 2 are combined. Claim 5, in the context of amended claim 1, should also be novel.

IV. Barany (U.S. Pat. 6,506,594) Does Not Anticipate Claims 1-9, 14 and 15.

Barany is directed towards detecting nucleic acid sequence difference using ligase detection with microarrays. The examiner cites to Col. 10, lines 63-64; and Col. 21, lines 40-48, but those citations only state "porous surface". Nor is there any description or enablement of "porous". There is no evidence the substrate is macroporous. The disclosure is so vague and general with lots of "laundry lists" that it could cover all polymers, so it not enabling nor does it satisfy the written description requirement. Col. 26, lines 40-65 do not disclose a porogenic solvent as in the pending claims. There is no teaching in Barany to use macroporous polymers as in the present claims.

V. Chang (U.S. Pat. 6,994,964) Does Not Anticipate Claims 1-9 and 12-15.

Polymer brushes are well-known. Books are written about polymer brushes. Many material exists about immobilization of biomolecules on polymer brushes.

Chang combined microarrays and polymer brushes and immobilization of biomolecules on polymer brushes. He utilized well-known polymer brushes and well-known immobilizations on polymer brushes to produce microarrays.

Chang uses procedures of making polymer brushes – i.e. the method to produce polymer substrates is very different from what is described in the present application. Polymer brushes described in Chang's patent are initiated by surface polymerization and results in submicron polymer thickness.

"A 'polymeric brush' ordinarily refers to polymer films comprising chains of polymers that are attached to the surface of a substrate. The polymeric brushes of this invention are functionalized polymer films which comprise functional groups such as hydroxyl, amino, carboxyl, thiol, amide, cyanate, thiocyanate, isocyanate and isothio cyanate groups, or a combination thereof, on the polymer chains at one or more locations. The polymeric brushes of this invention are capable of attachment or stepwise synthesis of macromolecules thereon."

From Example 1 of Chang's Patent: "The AIBN-APS-silanized substrate is subjected to radical polymerization. The substrate is immersed in a 20-50% solution of 2-hydroxy ethylmethacrylate (HEMA) in degassed DMF for various reaction times and temperatures. At a reaction temperature of 70°C, the surface AIBN molecule dissociated into two radicals, initiating polymerization to form hydroxyl-functionalized methacrylate polymer. The substrates were then washed thoroughly with DMF and water, and thoroughly dried. The resulting film thickness on silicon is monitored by ellipsometry or AFJ (atomic force microscopy). For example, a range of 5-30 nm thick pHEMA film is obtained after a 24-hour polymerization."

To produce brushes, one compound immobilizes on a surface that contain initiators of the polymerization. Then this surface is immersed in some solution containing monomers, and, under some conditions (e.g. temperature) the immobilized initiator produces radicals and brushes start to grow.

In contrast, in the present application, monomer solutions (containing initiators) are applied between two surfaces (slide and mark with spacers>10 microns), and then photopolymerization is initiated throughout the whole bulk solution between these two surfaces. Thus, "thick" block are produced, not "thin" brushes as in Chang.

In the present application, block copolymerization is used.

VI. A Prima Facie Case Of Obviousness Is Not Established.

Claims 10 and 11 were rejected under 35 USC §103 over Chang and Huang.

The examiner admits that Chang "does not teach the solvents are aromatic alcohols, e.g. cyclahexone." (Action, page 7). The examiner relies for this omission on Huang for teaching organic solvents in methacrylate polymerization and decides these are "functional equivalents." However, this is an unsupported conclusion and there is no evidence of suggestion or motivation to combine Chang and Huang.

In the present application, derivatization is achieved by incorporation of vinyl monomers that react after polymerization with some of the chemical groups from the biomolecules to form covalent bonds. (Specifically see [00037]). As shown in FIGs. 6 and 7, microchips (biochips) of the present invention have improved binding efficiency compared to commercially available biochips.

There is no teaching, suggestion or motivation to combine Chang and Huong. Even if combined, they do not include all the elements of claims 10 and 11.

VII. Conclusion

If there are any remaining issues, the applicants' representative requests an interview prior to issuing an Office Action.

Applicants request allowance of the pending claims. No fees are believed due at this time, however, please charge any additional deficiencies or credit any overpayments to deposit account number 12-0913 with reference to our attorney docket number (21416-93965).

Respectfully submitted,

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